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Cyanotech: A Strategic Audit

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Cyanotech

Strategic Audit

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Abstract

Microalgae is a fascinating group of organisms that possess a diverse array of interesting traits and benefits relevant to food, medicine, and biofuel. Extensive research behind the viability of microalgae to disrupt the market has sparked an emergent microalgae industry. Founded in 1983, one of the top microalgae companies in the world today is Cyanotech. With a 90-acre algae farm in Kailua-Kona, Hawaii and two flagship microalgae products that are world leaders in their categories, Cyanotech is well-positioned be setting the course for the industry and revolutionizing the use microalgae commercially. Despite these favorable attributes, Cyanotech has been trapped in a state of stagnation for nearly a decade which has brought about a steady decline in company performance. A new CEO, Mawae Morton, was hired in January, 2018 and the company has already seen an increase in sales and profitability. Implementation of a novel, calculated company strategy coupled with this new leadership might the recipe for revitalizing Cyanotech and solidifying their position as a dominant force in the microalgae industry.

Keywords: Cyanotech, microalgae, Bioastin, Spirulina, strategy



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Background

What is Algae

Algae are simple, non-flowering, and aquatic plants most often found in large groups. As one of the most biologically diverse categories of organisms, they take many shapes and sizes ranging from unicellular microalgae to multicellular species such as the giant kelp (Vidyasagar). From the depths of the oceans to the bird baths in our backyards, algae thrive. There have been over 70,000 unique species of algae identified and described to date and the number continues to climb. This biodiversity is unmatched and leaves researchers to reason that there is an existent, vast knowledge space regarding algae that is still unexplored.

Economic Value of Microalgae

In recent decades, algae have become something of a celebrity in the venture capital world. More specifically, microalgae have been the real talk of the town. Left and right, start-ups are racing to develop the next big food, fuel, or medicine using microalgae as the foundation for their entrepreneurial efforts. The millions of dollars being invested in this space prompts an obvious and fair question: what makes microalgae so unique? Put simply, evolution played out over one billion years has turned these organisms into models of efficiency in the natural world (Lewin). Microalgae grow and reproduce quickly - some species can double in size/population in as little as six hours. Able to survive in a wide array of environments, microalgae can be grown in freshwater, saltwater, and even wastewater. Like any other photosynthetic plant, microalgae feeds off of carbon dioxide and produces oxygen as a byproduct. This appetite for greenhouse gases could be leveraged to help drive emission levels down. Biomass harvested from microalgae is high in protein and oil content lending it to be an excellent source for biofuel or animal feed production. The list goes on, but the theme is constant, the microalgae industry is a hub for innovations relating to renewable energy, green alternatives for agriculture, and medicinal advancement (Hannon).

Cyanotech: A Brief History

One of the companies to emerge prior to the venture capital microalgae craze was birthed in a Washington State lab in 1983. Cyanotech first began to take shape when Dr. Gerald Cysewski began growing Spirulina in his garage. Quickly, he realized the

opportunity to produce spirulina of a higher quality that was cleaner than what was being imported to the United States at the time. From his studies, he also identified Spirulina as having the potential to flourish in a controlled production environment. Cysewski moved his tests from his garage to experimental production ponds in Nevada. These ponds didn't last long, however, as he identified Hawaii as having the ideal conditions to grow microalgae.

Through the rest of the 80s, Cyanotech continued to see steady growth and took advantage of any and all opportunities to expand their algae farm. By 1990, their first big seller hit the market - Nutrex Hawaii. Six years later, Cyanotech completed a public offering of its stock and successfully raised \$10.6 million. This cash was enough to complete the build of their algal production systems. Later in 1999, their second health supplement, BioAstin hit the market.

Cyanotech's goal through the course of the early 2000s was to gain steadfast credibility in their products. In 2002, they completed three human clinical trials supporting the health benefits of BioAstin. Their spirulina and bioastin received FDA approval in 2003 and 2010, respectively. Suddenly, Cyanotech's products were recognized as safe and there were dozens of studies supporting the health benefits to be gained from taking their supplements.

Fast forward to today, Cyanotech owns 90 acres of algae cultivation ponds, processing facilities, an on-site extraction plant, and office and research buildings. Their two products BioAstin Hawaiian Astaxanthin and Hawaiian Spirulina are the nation's top brands in their respective categories (Our History-Cyanotech). This narrow focus has kept this company on a slow and steady path free of distractions. As a result, they are regarded as a world leader in the microalgae industry.



Situational Analysis

External Analysis

Industry Trends

The microalgae industry has been on the rise over the last 20 years. Fueled by venture capital, many new microalgae companies have been sprouting up with intentions of revolutionizing the food, fuel, or medical industry with cutting edge algal solutions. These young companies focus heavily on research and development hoping that a scientific breakthrough will be their way to the top in this growing market. Although eager and well funded, the new players in this industry do not yet stack up against their predecessors. Like Cyanotech, the most successful companies in the microalgae space have been around since the 1980s or longer (Meticulous). This first to market advantage has allowed these companies to grow assets and find their niches during a time of low competition.

Another factor contributing to the lack of success for microalgae companies in their infancy is due to miscalculations in business viability. From roughly 2005 to 2012, dozens of microalgae companies went bankrupt. This period of time has been aptly named as the Great Algae Biofuel Bubble. There was a craze during this time because researchers began to realize that microalgae was an incredible candidate for biofuel production. VCs saw this as an opportunity to lay claim to an emerging biofuels market that would eventually overtake its non-renewable sibling industry - fossil fuels. Mouths watering from the high reward, these firms saw no problem taking a high risk and betting on these hungry microalgae companies.

What these firms and startups failed to realize is that the economy is not as forgiving as the laboratory. Although the research was valid and biofuels were successfully being reproduced in a lab setting, performing the same operation at scale is a different story. Factoring in capital needs, availability of water, environmental conditions, energy balance, growing, collecting, and drying, the equation suddenly shows that biofuels are nowhere close to being able to compete with the price point of fossil fuels (Wesoff).

Porter's 5 Forces

Threat of New Entrants	Low - Medium
Power of Suppliers	Low
Power of Customers	Medium
Threat of Substitution	High
Competition	Medium

The threat of new entrants in the microalgae industry is not very high for a number of reasons. The first and most obvious of them is the cost associated with building a facility. Algae farms are finicky. They must be located in an area with a temperate climate and plenty of space. Access to water is also important because the algae depend on it for growth. Acquiring the proper real estate for algae production at the scale to make it profitable is not easy. Machines for collecting and drying the algae are also an expensive starting cost. Even with all of the assets in place, microalgae farming takes an intense amount of intellectual background. Scientists and experts would need to be on staff to oversee the algae production operation. All that being said, it is not impossible for a new with adequate funding to grow and compete in this space.

Power of suppliers is also pretty low compared to other industries. Dependency on proper machinery is the aspect of the business with the most supplier volatility. After that machinery has been purchased, however, suppliers are not much of a factor. Companies will have to buy or harvest their initial algal bloom, but the colony will be self-sustaining thereafter.

Customers have a moderate influence on the microalgae industry. Differences in supplements derived from the same algae species are minimal. Because of this, with regards to health and dietary supplement products, customers will often choose the cheapest option. Having FDA approval, product backing research and testimonials also play a role in customer choice. This encourages healthy competition among microalgae companies to prove the value in their products.

The threat of substitute products is very high because the microbiology industry is a conglomeration of substitute products. Food and dietary supplements are a diverse and

highly substitutable product line. Medical products are traded in and out for each other at incredibly high rates as well. Antioxidants are everywhere so convincing the public that microalgae are the healthier, cheaper, and more sustainable choice is quite the task. Likewise, fossil fuels are always going to be a substitute for sustainable biofuels until they are price competitive.

Overall, this leaves the microalgae industry with a moderate level of competition. There are a healthy amount of players, but those that are dominant have been dominant for a long time. The market is growing and buyers are beginning to favor sustainable options in their shopping decisions. Between food, medicine, and biofuel, there are so many hats to wear in this industry. Niches still exist in all of these subcategories and the market is far from saturated. It can be reasonably suspected that the next 10 years will be accompanied by a continued uptake in this market.

Internal Analysis

From their near 40 years in the industry, Cyanotech has rooted itself firmly within the microalgae competitive sector. Due to their age and size, Cyanotech has developed many distinct advantages. Among these: their real estate. In the microalgae industry, facilities are perhaps the greatest barrier to entry. Cyanotech's state-of-the-art algae farm in Kailua-Kona, Hawaii is perhaps their most impressive and valuable asset. This 90-acre facility is among the largest of its kind in the world.

Apart from the physically impressive facility, the amount of research and publications that Cyanotech has produced for the scientific community is astounding. Cyanotech has just two products: BioAstin Hawaiian Astaxanthin and Hawaiian Spirulina. Between these two products, Cyanotech has been responsible for many research studies and clinical trials to support the claim of their products' effectiveness. For their Spirulina algae, they have released 18 publications speaking to this product's impact on topics that include but are not limited to: antioxidant/cognitive support, cardiovascular health/lipid support, and immune support. Similarly, for their Astaxanthin algae, they have released a staggering 48 publications speaking to this product's impact on topics such as antioxidants, exercise recovery, eye health, immune support, joint health, and skin health (Cyanotech).

Something that often gets missed in the conversation about what makes a company successful is the people. Cyanotech's leadership team is experienced, diverse, and highly specified for an executive level position as a microalgae company. Mawae Morton, Cyanotech's CEO as of January 2018, was formerly the CEO for a Hawaii based forestry and bioenergy development company. Even prior to that role Morton was involved in the renewable energy sector as a managing director at Merica International. Although these former positions are not algae-specific, his role is to be the driving force behind management and direction for the company - responsibilities he is well-equipped to perform. The brains behind the microalgae is Chief Science Officer, Gerald R. Cysewski, Ph.D. Dr. Cysewski co-founded the company in 1983 and has served as director of the company since that time. Having Dr. Cysewski on Cyanotech's senior leadership team is an incredibly valuable asset. This makes Cyanotech is one of the few successful algae companies who still have a founding member serving in a leadership role providing direction. With 36 years of industry experience, Dr. Cysewski has watched and participated in the rise of the microalgae industry first hand.



Strategic Alternatives

Overview

Considering the present state of the company, Cyanotech is positioned interestingly in the microalgae market. Valuable physical assets such as their real estate and their facilities couple with a strong leadership team and seasoned in-house research differentiate Cyanotech from their competition. Leveraging these strengths, there are many alterations to their strategy that could be made. Their product line is currently two products deep. Diversifying this could help them penetrate new markets. Additionally, no one seems to be in charge of marketing. Routing funds to explore new marketing options could expand their customer base and bring in new revenue. Another option for change is to allocate more of the budget to research and development (R&D). Finally, it would not be a bad idea to continue operating as usual. Cyanotech has a firm hold on their niche in the market and is one of the most dependable and trusted brands in microalgae.

Strategic Alternatives

1. Diversify product line
2. Hire a marketing team
3. Invest in research and development
4. Keep the same business model

Diversify Product Line

Presently, Cyanotech carries a mere two products: BioAstin Hawaiian Astaxanthin and Hawaiian Spirulina. These two products fall under the category of dietary supplements. This is an incredibly narrow focus with an incredibly narrow product line. As a company, Cyanotech has been stuck in this rut for a long time. The last time they released a new product was BioAstin Hawaiian Astaxanthin in 1999. It is time that they diversify their product line by either deepening their grip on the dietary supplements market or expanding to new markets entirely.

There are plenty of unrealized opportunities for growth in the dietary supplement market. Microalgae contain proteins, vitamins, minerals, and fibers - all of which point at algae being a good candidate for other dietary supplements. One promising option that is growing in popularity is algae protein powder. It is a more environmentally friendly, vegan option compared to traditional whey protein. Additionally, it offers many perks that soy proteins do not offer. First, it is allergy friendly - some people with allergic sensitivities actually cannot take whey or soy proteins. Algae protein powder also comes with several added health benefits like antioxidants and omega-3 fatty acids. Because microalgae are single-celled, they digest quicker than soy and whey proteins making them excellent supplements for athletes who need quick recovery (PlantFusion). This option to expand into the protein market is one that Cyanotech should not ignore.

Breaking into new markets is another way that Cyanotech can break from the status quo. The animal feed market is a great candidate for algae. It is an affordable option and it has a higher dry protein content than corn, soy, and wheat. Additionally, it is easier on the animal's digestive systems and offers additional benefits like a boosted immune system. For these reasons, microalgae may be the answer to feeding the world's increasing population of livestock.

Hire a Marketing Team

Perhaps one of Cyanotech's biggest problems is that they lack a team in charge of marketing and selling their products. The officers that make up their executive team are as follows: CEO - Chief Executive Officer, CSO - Chief Science Officer, CFO - Chief Financial Officer, Vice President of Manufacturing and Infrastructure, and Vice President of Quality, Regulatory, and Governmental Affairs. They do not have a Chief Marketing Officer, nor any position that seems they would absorb this responsibility.

Marketing is a crucial aspect of a successful business. Cyanotech is competing against companies that are spending more money on research and development and more money on marketing. If they want to compete in this space for long, they cannot let their 20-year-old products market themselves. They need a marketing team in some capacity to get their product into the hands of people who do not know it exists.

There are two real options for Cyanotech to consider when it comes to hiring a marketing team. First, they can do it the traditional route by hiring and employing an in-house marketing team. This change would likely have to be accompanied by appointing a Chief Marketing Officer so that the CEO would not have to absorb these new responsibilities. Another option that is cheaper and more feasible is outsourcing their marketing efforts by hiring a marketing agency. The benefit of this approach is that it would keep their payroll down and allow the company to be more experimental as they begin their marketing efforts.

Allocate Funds for Research and Development

Spending money on research and development is almost universal in the microalgae industry. Cyanotech does spend adequate funding for research of its current products to bolster the reliability of their effectiveness. Where they fall short, however, is in allocating funds toward the development of new microalgae solutions and products.

Microalgae has many interesting qualities and properties that make it the focal point of much research relating to food, medicine, and biofuel. With the facilities that Cyanotech has, they have the ability to budget more money towards researching the cutting edge in microalgae. Finding an emergent breakthrough before their competitors would solidify Cyanotech's place as a world leader in microalgae. The infrastructure and space that

Cyanotech possesses give them the leg up they need to beat competing companies and researchers to the punch when it comes to the search for revolutionary findings.

Stay the Same

The company has existed for a long time and they are not sinking yet. Despite only carrying two products and a lack of marketing, they still are seeing gradual success. In their annual report for 2018, they laid out the improvements that have been made over the last year. BioAstin and Spirulina sales are up 12% and 18%, respectively. Cyanotech experienced a profit increase of \$2.2 million from 2017 to 2018. Online sales on Amazon have never been better as they have now achieved “Best Seller” status and saw sale increase 8-fold accordingly.

In 2017, Cyanotech finished with a loss of \$1,215,000. Under the new leadership of Mawae Morton as CEO in 2018, the company increased sales by 6.4% and gross profit by 9.4%. With these new numbers, the company ended the fiscal year with net income of \$1,025,000 - a swing of \$2,240,000 from 2017 (Cyanotech). Under this new leadership, it very well may be the case that Morton knows what he is doing and the company is in good hands.



Recommendations

Product Recommendations

Currently, Cyanotech carries a mere two products: BioAstin Hawaiian Astaxanthin and Hawaiian Spirulina. This lack of an extensive product line is likely for a number of reasons. Firstly, it is a long process to receive FDA approval on dietary supplements and dealing with the red tape is burdensome. Secondly, research studies are expensive and take time. The two products that Cyanotech does offer are well tested and proven to be effective through many clinical trials. To start this process over from ground zero is a daunting task.

Despite the reasons there may be to hold out on adding to the product line, diversification may be the only way to drive the company forward. Cyanotech has not released a new product in 20 years. This has led to a stagnation in innovation, research,

and profits. If they go another 20 years without finding a new vessel for bringing their microalgae to the world, they will be crushed by their young, creative, risk-taking competitors. I recommend that they diversify their product line by trying to penetrate the animal feed market.

The choice to pursue the animal feed market as opposed to diving deeper into the dietary supplements space is with reason. Out of the top ten microalgae companies in the world, only one specialized in animal feed (Meticulous). This company is called Cellana and they were conceptualized in 2004 making them over 20 years younger than Cyanotech. Additionally, Cyanotech's 90-acre facility dwarfs the 6-acre facility of Cellana (Cellana). This means to compete with Cellana, Cyanotech would only need to repurpose a fraction of their algae production.

Marketing Recommendations

Coupled with this diversification of their product line, I recommend that Cyanotech take an active role in efforts to market their products. In their history, Cyanotech's marketing style has been nearly non-existent. The only publicity that Cyanotech receives is when media channels feature them in an attempt to satiate their viewers desire to learn more about the growing microalgae industry. In 2012, Astaxanthin was featured in popular media as "The #1 Supplement You've Never Heard of That You Should Be Taking." Sales exploded after this event, but unfortunately, press releases and media partnerships slowed in the coming years.

I recommend that Cyanotech outsource marketing efforts by hiring a marketing agency to get their products in front of the eyes of consumers. Marketing will be focused on promoting their dietary supplements to health magazines, websites, and other popular health media outlets. This will help drive sales of their current products: BioAstin Hawaiian Astaxanthin and Hawaiian Spirulina. Given all of the research and support that these products have, marketing will be safe and help Cyanotech gain even more credibility from consumers.

Research and Development Recommendations

The influx in the sales of their dependable products derived from additional marketing efforts is exactly what Cyanotech needs to fund research and development of a new

animal feed product line. This is the only amount of research and development that I would recommend. Cyanotech has seen success in the past because they have stayed away from being too R&D heavy. When the biofuel bubble left many companies bankrupt, Cyanotech persevered because they stuck to their guns. I do think, however, that there is a fine line to tow and performing zero research and development activities is surely unhealthy for a company in this industry.



Implementation

Timeline

To implement the recommended changes will take patience and discipline of leadership. I chose a 5-year plan for the execution of these recommendations to give Cyanotech plenty of time to adjust to growth and change. Unlike a company in the startup phase, Cyanotech does not have the benefit of angel investments nor a culture that is accustomed to rapid change. Playing this strategy out over half a decade is the only way I see this plan being successful.

Date	Activity
June 2019 to December 2019	Search for a marketing/public relations agency
January 2020	Hire a public relations agency
January 2020 to December 2021	Observe the effects of marketing and press releases; begin saving capital and budgeting for R&D
January 2022 to June, 2021	Research and development for new animal feed products
July 2021 to December 2022	Begin clinical trials on animal feed products; seek FDA approval
January 2023 to December 2023	Approach animal feed buyers and get orders; begin production
January 2024	Launch animal feed product line

Execution

By foregoing the hiring of a marketing agency until the next fiscal year, is good for two reasons. First, Cyanotech leadership has the time to make an informed and calculated decision regarding who to partner with. Second, shareholders are given another year to observe how the new CEO performs without the aforementioned strategy. If he seems to be growing the company at a steady rate, maybe it is best to stay out of his way for another year or two and reevaluate Cyanotech's options at that time.

Giving the company a full fiscal year of focusing on the marketing agency alone is a way to make the transition to this new business strategy gradual. Additionally, Cyanotech does not have the amount of capital built up that will be needed to perform the research and development necessary to launch a new product line. Taking a year to observe the effects of marketing on their flagship products will ideally give them a chance to boost sales and save money for the coming changes.

The research and development process is long and unpredictable. Even with the amount of research that has been done within the walls of Cyanotech, giving the company a year and a half for research and development is a healthy window that will not encourage cutting corners. Likewise, clinical trials and FDA approval will both be necessary if Cyanotech wants to continue marketing themselves with the same product reliability guarantee that they have in the past.

Finally, with the new capital built up over three years of marketing and with a new product line that has been developed, researched, and FDA approved, it is time to begin production. Allowing a year for growth of the algae and manufacturing of the product in tandem with contacting animal feed buyers for orders will ensure a successful product launch in January of 2024.

Contingency Plan

This is not an idealized world and, as in any strategic plan, there are many risk factors associated with change. Cyanotech has not been performing well over the last 5-10 years. Under new leadership, they have seen an increase in profitability, but the down years have left them left financially capable as some of their biggest competitors. Their

competitors may try to squeeze Cyanotech out of the market if they see that Cyanotech begins to make grabs at their market share.

Regardless of the threat of competition, implementing a strategic plan is safe as long as there are contingencies in place. Chances to reevaluate this strategy are baked into the execution timeline of this plan. At the beginning of the next fiscal year, Cyanotech will have the go/no-go decision to make after observing financial performance in the 2019 fiscal year. Additionally, before beginning research efforts, Cyanotech will have the opportunity to look at how the marketing agency partnership has affected sales. If at either of these points Cyanotech realizes that the plan is destined for failure, they have the option to pivot and regroup.



Conclusion

Cyanotech sits at the cusp of a very interesting moment in the microalgae industry. Having the biofuel bubble behind them, the players in the microalgae space are now more specialized and focused than ever before. With biofuels being less sought after, many of these companies have encroached on the dietary supplements market. At this point, Cyanotech needs to make strategic changes that are either going to tighten their hold on the dietary supplements market, expand to a brand new market with less saturation, or perform some combination of both. New leadership and a growing public interest in microalgae put Cyanotech in a strong position to execute a change and set the course for the growing microalgae industry.



References

Algae Basics - Benefits of Algae, allaboutalgae.com/benefits/.

“Algae – A Smarter Protein Source for a Healthy Lifestyle.” *PlantFusion*, plantfusion.com/blogs/plantfusion-lifestyle/algae-a-smarter-protein-source-for-a-healthy-lifestyle.

“Company Overview.” *Cellana*, cellana.com/about-us/company-overview/.

Cyanotech. (2019). 2018 Annual Report. Retrieved from https://www.cyanotech.com/pdfs/Cyanotech_2018_Annual_Report-20460.pdf.

“Executive Team.” *Nutrex Hawaii*, www.nutrex-hawaii.com/pages/executive-team.

Hannon, Michael, et al. “Biofuels from Algae: Challenges and Potential.” *Biofuels*, U.S. National Library of Medicine, Sept. 2010, www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/.

Lewin, Ralph A., and Robert A. Andersen. “Algae.” *Encyclopædia Britannica*, Encyclopædia Britannica, Inc., 24 Jan. 2019, www.britannica.com/science/algae/Evolution-and-paleontology-of-algae.

Meticulous. “Top 10 Companies Operating in Algae Products Market.” *Meticulous Blog*, 24 Jan. 2019, meticulousblog.org/top-companies-algae-products-market/.

“Our History – Cyanotech.” *Cyanotech*, www.cyanotech.com/our-history/.

Vidyasagar, Aparna. “What Are Algae?” *LiveScience*, Purch, 4 June 2016, www.livescience.com/54979-what-are-algae.html.

Wesoff, Eric. “Hard Lessons From the Great Algae Biofuel Bubble.” *Greentech Media*,

Greentech Media, 19 Apr. 2017,
www.greentechmedia.com/articles/read/lessons-from-the-great-algae-biofuel-bubble#gs.4swzjm.